

Chapter 20 Weather Patterns and Severe Storms

Section 20.1 Air Masses

This section describes air masses and explains how they affect weather.

Reading Strategy

As you read, write a definition for each of the terms in the table. Refer to the table as you read the rest of the chapter. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Term	Definition
Air mass	a. an immense body of air characterized by similar temperatures and amounts of moisture at any given altitude
Source region	b. area over which an air mass gets its characteristic properties of temperature and moisture
Polar air mass	c. cold air mass that forms at high latitudes toward Earth's poles
Tropical air mass	d. warm air mass that forms at low latitudes
Continental air mass	e. dry air mass that forms over land
Maritime air mass	f. humid air mass that forms over water

Air Masses and Weather

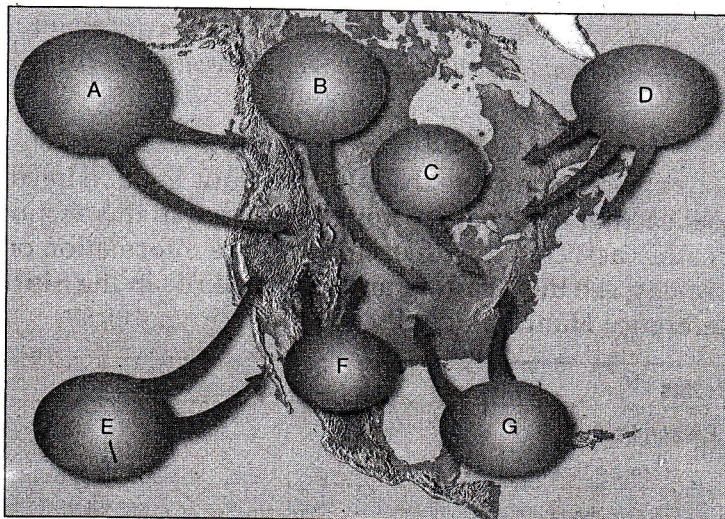
- Changes in weather patterns are often caused by movement of _____ air masses.
- ☒ Is the following sentence true or false? As an air mass moves, its characteristics change. _____ true
- Circle the letter of a common size for an air mass.
 - 600 km or less across
 - ☒ 1600 km or more across
 - 16,000 km or more across
 - 160,000 km or more across

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Classifying Air Masses

4. Identify each labeled air mass on the figure as continental tropical, continental polar, maritime polar, or maritime tropical.

- A. maritime polar
 B. continental polar
 C. continental polar
 D. maritime polar
 E. maritime tropical
 F. continental tropical
 G. maritime tropical



5. ☒ List two characteristics used to classify air masses. overall temperature,
surface over which the air mass forms
6. Circle the letter of the terms that describe the temperature characteristics of an air mass.
- a. continental and maritime
 - b. continental and tropical
 - c. polar and maritime
 - ☒ d. polar and tropical

Weather in North America

7. ☒ Is the following sentence true or false? Much of the weather in eastern North America is influenced by continental tropical and maritime polar air masses. false
8. Although continental polar air masses are not usually associated with heavy precipitation, they can sometimes cause lake-effect snow.
9. Circle the letter of the type of air mass that is the source of much of the precipitation that falls on the eastern United States.
- a. continental tropical
 - ☒ b. maritime tropical
 - c. maritime polar
 - d. continental polar
10. Is the following sentence true or false? In the winter, maritime polar air masses often bring rain and snow to the west coast of North America. true
11. What causes Indian summer? The movement of continental tropical air masses into the Great Lakes region in the fall causes Indian summer.

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Section 20.2 Fronts


This section explains how fronts form, describes different types of fronts, and explains how mid-latitude cyclones affect weather in the United States.

Reading Strategy

As you read, complete the outline below. Include information about how each of the weather fronts discussed in this section forms and the weather associated with each. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.





Fronts	
I. Warm front	
A.	warm air that moves into an area formerly covered by cooler air
B.	light-to-moderate precipitation over a wide area for an extended time
II. Cold front	
A.	cold air that moves into a region occupied by warmer air
B.	heavy downpours and winds followed by a drop in temperature
III. Stationary front	
A.	flow of air parallel to front
B.	gentle-to-moderate precipitation
IV. Occluded front	
A.	a cold front overtakes a warm front
B.	light precipitation

Formation of Fronts

1.  A front is a(n) boundary that separates two air masses.
2. Is the following sentence true or false? Like air masses, most fronts are very large. false

Types of Fronts


Match each description with its front.

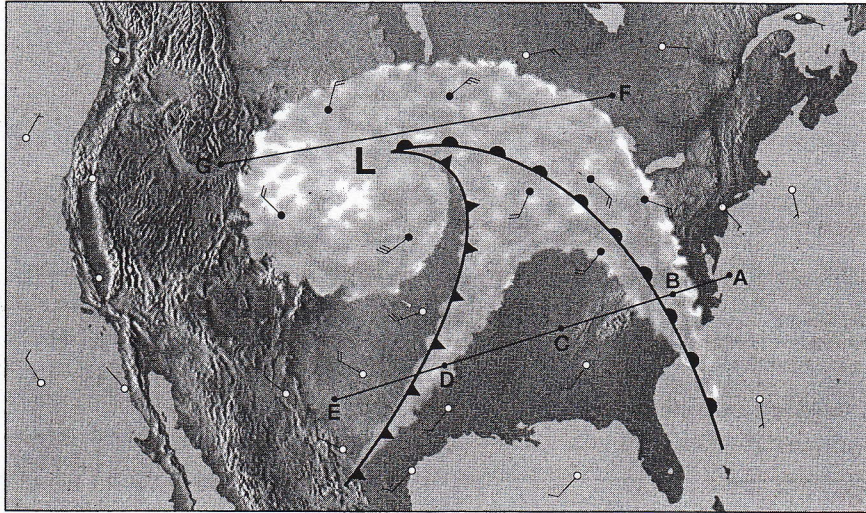
Description	Front
<u>c</u> 3.  Air flow is almost parallel to the line of the front, and the position of the front does not move.	a. warm front
<u>b</u> 4.  Cold, dense air moves into a region occupied by warmer air.	b. cold front
<u>a</u> 5.  Warm air moves into an area formerly covered by cooler air.	c. stationary front
<u>d</u> 6.  A cold front overtakes a warm front.	d. occluded front

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7. A warm front often produces a(n) gradual increase in temperature.
8. Is the following sentence true or false? Forceful lifting of air along a cold front can lead to heavy rain and strong winds.
true

Middle-Latitude Cyclones

9.  The middle-latitude cyclone shown in the figure is a center of low pressure.




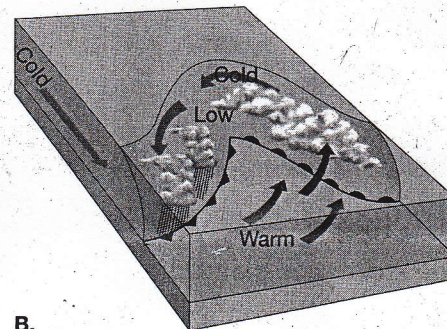
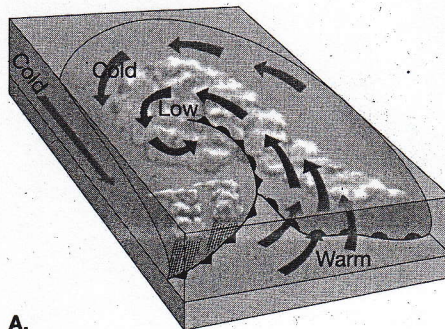
10. Name the type of front shown at each of these locations in the figure.

location B: warm front

location D: cold front

The Role of Airflow Aloft

11.  What often fuels a middle-latitude cyclone? Air high up in the atmosphere often fuels a middle-latitude cyclone.
12. In what order do the stages of a middle-latitude cyclone shown in the figures occur? B, then A



13. Is the following sentence true or false? Figure A shows the development of a stationary front. false

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Section 20.3 Severe Storms

This section discusses the causes and nature of thunderstorms, tornadoes, and hurricanes.

Reading Strategy

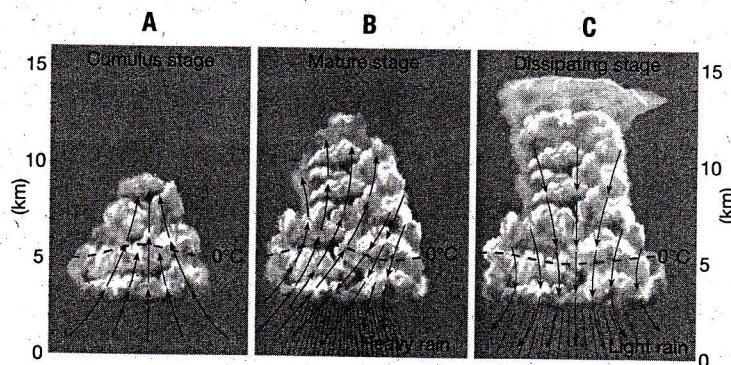
Complete the table as you read this section. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Severe Storms		
	Causes	Effects
Thunderstorms	a. warm, humid air rising in an unstable environment	b. gusty winds, heavy rain, hail
Tornadoes	c. associated with thunderstorms and the development of a mesocyclone	d. violent windstorm, isolated path
Hurricanes	e. water temperatures warm enough to provide heat and moisture to air	f. widespread damage as winds can reach 300 km/h

Thunderstorms

1. ⚡ A thunderstorm generates _____ lightning _____ and thunder.
2. ⚡ How do thunderstorms form? Warm, humid air rises in an unstable environment.

Using the figure, match each description to its thunderstorm stage.



Description	Thunderstorm Stage
<u>c</u> 3. The storm cools and dies down.	a. cumulus stage
<u>a</u> 4. Updrafts of warm air cause the cloud to grow upward.	b. mature stage
<u>b</u> 5. Heavy precipitation falls.	c. dissipating stage

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Tornadoes

6. ☐ A tornado is a violent windstorm in the form of a(n) rotating column of air.
7. Is the following sentence true or false? Tornadoes occur mainly in the winter. false
8. ☐ Circle the letter of the type of storm usually associated with tornadoes.
 - a. hurricane
 - ☒ b. thunderstorm
 - c. lake-effect snow
 - d. typhoon
9. Why are the maximum winds inside a tornado so high? Pressures inside tornadoes are much lower than outside, so air rushes into the tornado.
10. A tornado warning is issued when a tornado has actually been sighted in an area.

Hurricanes

11. ☐ To be considered a hurricane, a tropical cyclone must produce sustained winds of at least 119 km per hour.
12. Is the following sentence true or false? Hurricanes are the most powerful storms on Earth. true
13. Why are hurricanes becoming a growing threat? More and more people are living and working near coasts.
14. ☐ Hurricanes usually develop in late summer because they are fueled by heat and moisture from warm water.
15. Is the following sentence true or false? The greatest wind speeds and heaviest rainfall in a hurricane occur in the eye. false
16. Circle the letter of the center of a hurricane.
 - a. typhoon
 - b. eye wall
 - ☒ c. eye
 - d. surge
17. When a hurricane's eye lands, a dome of water about 65 to 80 km wide called a storm surge sweeps across the coast.
18. List two situations in which a hurricane weakens. It weakens when it moves over cool ocean waters and when it moves over land.